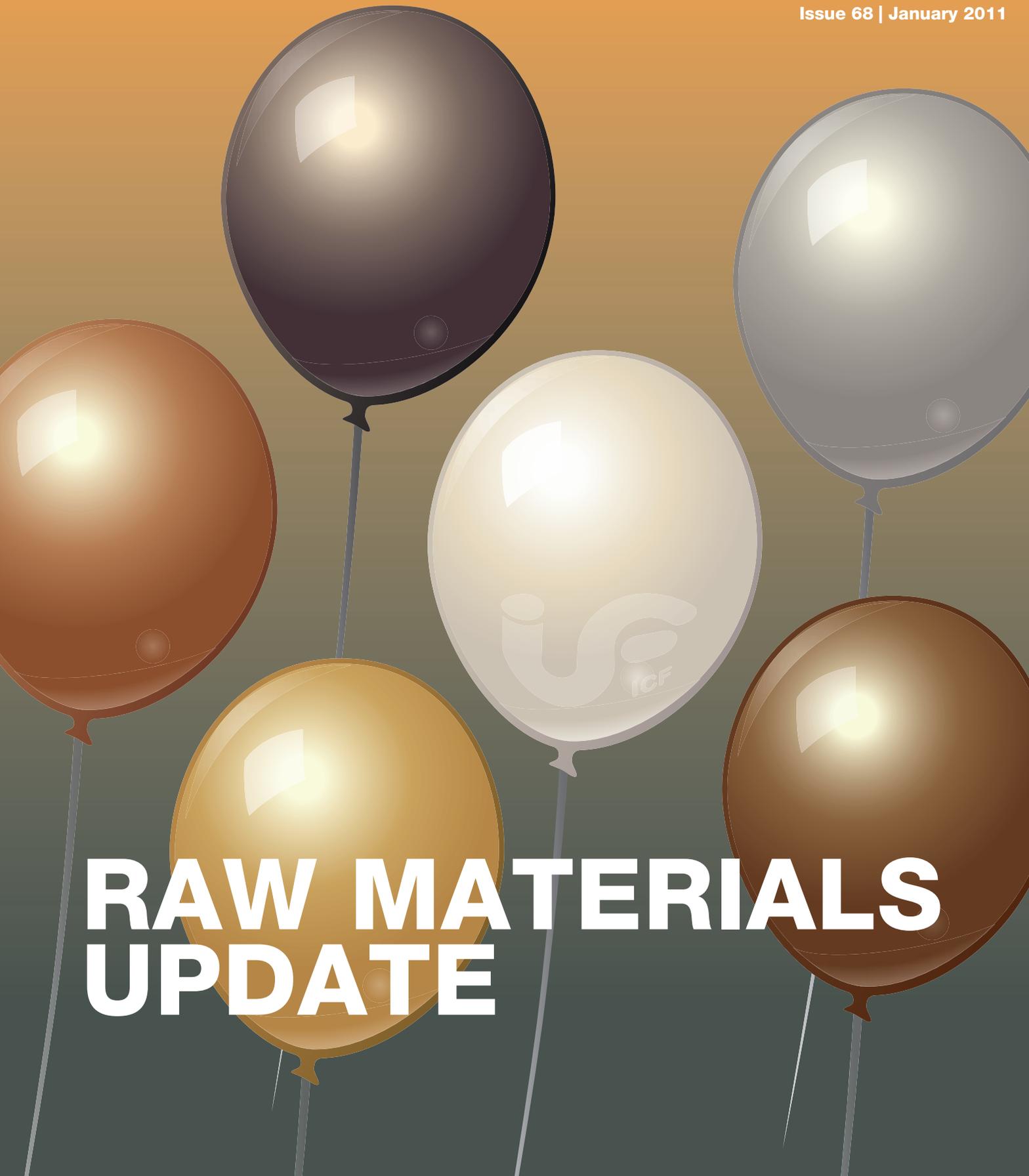


NEWS



Issue 68 | January 2011



RAW MATERIALS UPDATE

ICF NEWS



It is with deep regret that we have to inform you that Mr. Norio Okayama has passed away on 14 November 2010 at the age of 70. Mr. Okayama was a member of the Council of ICF from 2003 to 2007, served as Vice President from 2004 to 2005 and was President from 2006 to 2007. Our deepest felt commiserations go to his family.

ICF CONGRESS CAPE TOWN 2010

102 delegates found their way to Cape Town. From many reactions received we believe that the congress program as well as our social events and the partner program were very well received.

Our thanks go to Conrad Schmidt and his colleagues at Aberdare Cables. They were instrumental in allowing the membership to gain a first-hand insight into the challenges and opportunities which are facing South Africa.

We are in close contact with Luyanda Mpahlwa to identify a local project which ICF - on behalf of its members - will support on a sustainable basis. We will report on the details in our next edition of the ICF Newsletter.

Please note that the presentations of the Cape Town Congress have been uploaded to the password protected section of the ICF website.

ICF CONGRESS NEW DELHI 2011

This year's Congress will be held at the Hotel Imperial from 19 to 23 October. We will again provide a focus on the region of the Congress with political and industrial keynote speeches.

The invitations with the detailed program will be sent to all member companies by the end of April.

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RAW MATERIALS UPDATE

Provided by CRU



INTRODUCTION

Continuing Price Volatility

In two previous issues of the ICF Newsletter we have looked at the impact of price trends of major raw materials on the cable industry and the industry's customers, the last of these being two years ago. During 2005 and 2006 prices of many key raw materials used in cable-making rose sharply. In some cases material prices became much more volatile, with substantial fluctuations

in market prices on a short timescale. Since then the volatility has continued and after a slump due to the economic crisis that hit at the end of 2008, prices have now risen again. The price of copper in particular is now a major talking point in the cable industry and so we thought it was appropriate to revisit this topic in this issue.

Impact of High Material Prices

In this article we update the discussion of raw material price trends contained in the earlier articles. We look

at developments in some key cable-making materials over the past two years and we also discuss the impact of high material prices on some sectors of the cable market. We take a renewed look at some potential issues relating to material substitution (especially substitution of copper by alternatives) in some types of cable, and review the possible impact of CCA (copper-clad aluminium) conductors. Another issue in many markets that has become a growing problem as a consequence of persistently high metal prices is cable theft.

RAW MATERIAL PRICE TRENDS

Recent Copper Price Trend

After reaching peaks of over US\$9,000 per tonne in 2008 the price of copper fell sharply at the end of that year as the full impact of the global economic crisis hit home and most markets entered a recession. The price more than halved with the average in Q1 2009 standing at just US\$3435/tonne. Since then the price has staged a steady recovery with the result that the price rose in each subsequent quarter to reach US\$7243/tonne in Q1 2010. There was then a temporary pause before the price started to move upwards again and as we write this article in Mid November the price is hovering around the US\$8,400/tonne mark, although it

did recently move temporarily to near to US\$9,000/tonne. > Slide 1

What is Driving the Rising Price?

In part the recent rise in prices has been supported by the weakness in the US Dollar, but this is only part of the story. Much of the bullishness is supported by a faster than expected recovery in refined copper consumption, particularly in Asia, and reduced concerns about the possibility of a double dip recession. LME stocks have continued to fall and currently stand at around 360,000 tonnes, with total exchange stocks at close to 500,000 tonnes. Falling stocks are typically associated with rising prices. Another factor is the impact of the financial sector, with much of the talk at the recent LME week centring on the potential impact of physically backed Exchange Traded Products (ETP).

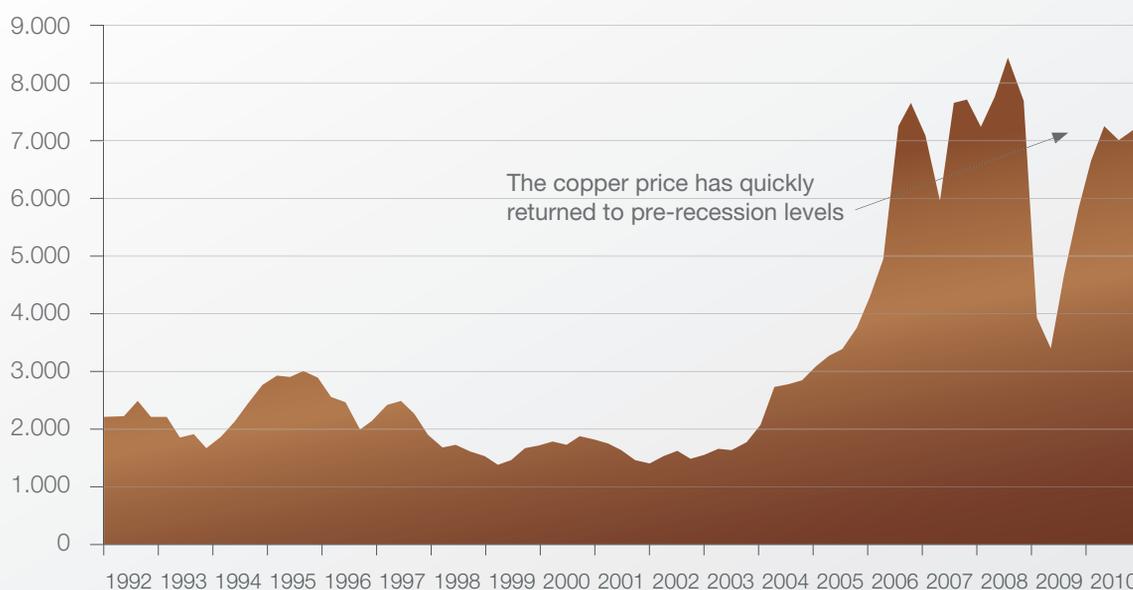
For example Blackrock is looking to launch a copper ETF (Exchange Traded Fund) that is backed by 121,000 tonnes of metal, and a number of other companies are also looking to launch similar products backed by physical stocks. It is not yet clear exactly what impact these funds will have but if they do remove copper from the market this is likely to push prices up even further.

Supply Struggling to Keep Up With Demand

After recording a surplus of over 1 million tonnes in 2009 refined copper supply has grown little this year, but demand has risen rapidly, and as a result demand is expected to have exceeded supply in 2010 with the market forecast to post a small (123,000t) deficit. Global demand for wire and cable, which is the biggest consumer of copper, is now rising quite quickly. For only the second time in the

QUARTERLY AVERAGE COPPER PRICE

US\$/tonne (LME Cash)



Slide 1 | Data: CRU, LME

last decade (the other being 2004), all the major regions of the world will post an increase in wire and cable consumption. In part this is down to comparisons with the very weak market in 2009, but in general the recovery has been much stronger than many expected. Mine output has been subdued this year, with no major new projects coming on stream and some existing mines seeing ore grades fall. This is despite this year having been a good one so far in terms of the absence of production disruptions.

Scrap Supply Has Been an Important Factor

Scrap has now become a very important component of the copper market. After the crash in copper prices in Q4 2008, following the turmoil in financial markets, scrap had all but disappeared as economic activity stalled. 2009 was a year of very poor scrap

generation and availability. Moreover, traders were unwilling to sell scrap to China (the world’s largest consumer) after buyers reneged on their contracts in Q4 2008 as copper prices dropped sharply. We also believe that there is no longer a readily available scrap pool for the copper market to draw on and users are dependent on current generation. Also, given that industrial production remains well below peak levels in the major scrap markets of North America and Western Europe, lower quantities of process scrap are being generated. The global supply of scrap (using world copper scrap trade as a proxy) remains over 10% below pre-crisis levels. The impact of the tightness is being felt almost entirely in China and partly explains the escalation in refined consumption growth last year, as cathode imports made up the shortfall. Higher copper prices and low scrap discounts have seen smelters

outbidding semi fabricators to buy the scrap that is available.

So What is the Price Outlook for Copper?

After a modest deficit in 2010 we are forecasting a more significant deficit of 416,000 tonnes in 2011 as supply further struggles to keep up with demand. This deficit coupled with a continuing tight scrap market and the potential influence of the financial community means that prices look set to rise further next year. Peaks of over US\$10,000/tonne are possible and we are forecasting that the average price for next year will be well over US\$8,000/tonne, with upside potential to this forecast. The market is forecast to return to balance in 2012, but with stocks still remaining low prices are expected to remain volatile and only slightly lower than in 2011. In 2013 a

QUARTERLY AVERAGE ALUMINIUM PRICE

US\$/tonne (LME Cash)



Slide 2 | Data: CRU, LME

number of new mining projects are due to come on stream and supply should grow at a faster rate than demand and as a result we are forecasting a surplus of 500,000 tonnes. This should lead to an easing of prices, which are forecast to fall back to an average of under US\$7,000/tonne.

Implications for the Cable Industry

With higher prices expected in the short term, coupled with significant volatility, cable manufacturers will need to carefully control their exposure to the copper market. Working capital requirements will be high and there is also the possibility of physical shortages for those companies that have not secured supplies. There is also likely to be growing interest in alternatives to copper and we will discuss the issue of substitution later in this article.

Aluminium Price is Much More Subdued

During the run up of prices that started in 2006 the aluminium price followed the copper price, and when the crash in prices occurred in Q4 2008, the aluminium price continued to behave in a similar way to copper. Since then though whilst the copper price has bounced back to near to pre-crisis levels the aluminium price has only staged a partial recovery and is now trading at around US\$2,300/tonne compared to near US\$3,000/tonne at its peak. Having settled at around US\$2,000/tonne the price has risen in the last month or so, but much of this is related to the weakness in the US Dollar and the impact of the high copper price than any underlying strengthening in the fundamentals that underpin the aluminium price.

> Slide 2

What are the Fundamentals Driving Aluminium?

Unlike in the copper market supply of primary aluminium has more than kept up with demand and as a result stock levels are quite high at present. Total reported stocks currently amount to almost 6.5 million tonnes which at current usage rates is almost 100 days supply, although a significant portion of this stock is locked up in financing deals, which makes it unavailable to the market in the short term.

Demand growth is robust at present but the supply side is more than able to keep up with demand and even the decision by China to shut down some smelting capacity due to energy restrictions has only provided a mild boost to the market. There is some talk of an aluminium ETF being launched but with stocks at current levels this should not have any significant impact on the price.

Aluminium Price Outlook

With stocks quite high and stable and new supply side projects being planned, supply is forecast to be well able to keep up with the growth in demand. As a result we believe there is little upside potential to the aluminium price over the next couple of years. The only thing that could change this is if China were to limit its production due to power supply issues and become a large net importer, but we believe this is unlikely to happen.

Consequently we are forecasting that the aluminium price will ease slightly from its current level and that the average price for 2011 and 2012 will be between US\$2,200 and US\$2,300/tonne. With the copper price forecast to be higher in 2011 this means that the ratio of the copper to aluminium price is expected to rise further.

Other Metals: Zinc

Zinc's main use in the cable industry is for galvanising steel wires and tapes used in armouring and overhead conductors. Like the aluminium price, the zinc price has been relatively subdued since the fall from its pre-crisis highs and, having at one point traded briefly above US\$4,000/tonne it, is now trading at a little over US\$2,000/tonne, with an average for the first nine months of 2010 of US\$2,106/tonne.

China is the biggest producer and consumer of zinc and there are significant stocks of metal here which has been holding back the price. As with other metals there is talk of an ETF being launched and there are some issues with potential power supply problems in China and this, coupled with the weakness in the US Dollar and a spill over from other metal markets, means that there is cautious optimism amongst industry participants that the zinc price will trade sideways or even modestly higher in 2011.

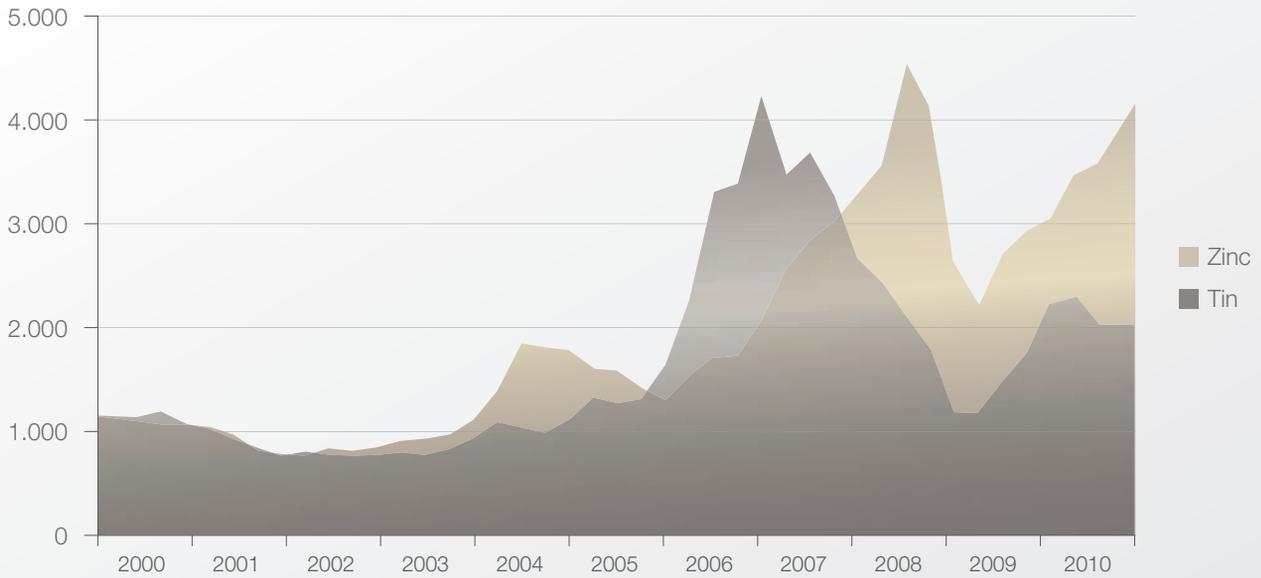
> Slide 3

Other Metals: Tin

Tin is a relatively minor element of metal consumption for the wire and cable industry as a whole, being primarily used for coating copper conductors used in some communication and LV energy cables. The volumes of tin consumed are small due to the very thin layer used, but it is still quite an important element for some cables. The tin market has some similarities to the copper market with the price having recovered all the losses during the financial crisis and it has recently been trading at a new peak of over US\$27,000/tonne. This price is being supported by an excess of demand over supply, with stocks falling and the market expected to be in deficit for 2010. There are some issues

QUARTERLY AVERAGE ZINC AND TIN PRICES

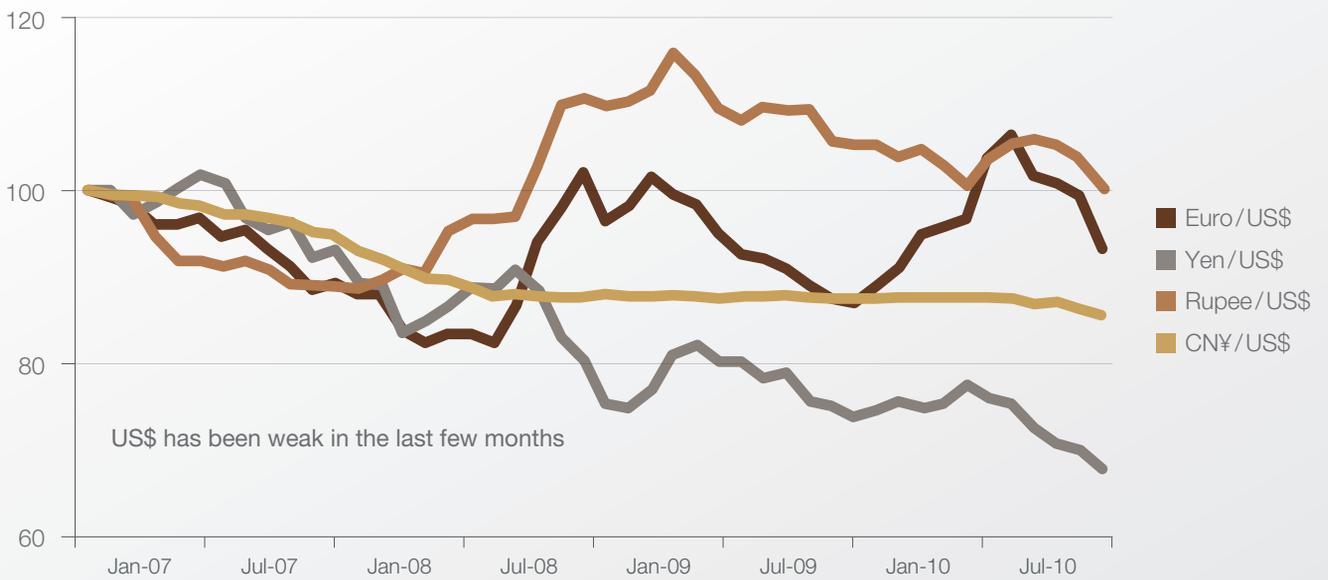
US\$/tonne (LME cash)



Slide 3 | Data: LME, CRU

EXCHANGE RATE TRENDS AGAINST US\$

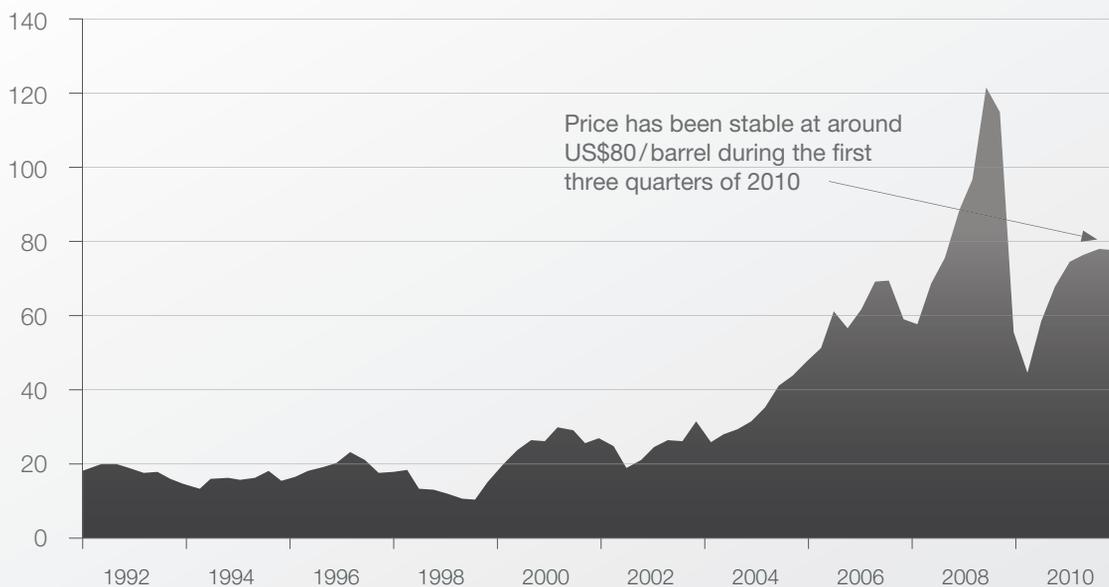
(Jan 2007 = 100)



Slide 4 | Data: CRU

QUARTERLY AVERAGE PRICE BRENT CRUDE OIL

US\$/barrel



Slide 5 | Data: EIA, CRU

with substitution due to the high price but with the supply side position looking tight for at least the next couple of years the forecast is that prices will rise further next year and could even reach the US\$40,000/tonne level. We have heard reports that in Europe there is a shortage of tinning capacity, with demand for tinned copper having been boosted by its use in cables for photovoltaic power installations.

Other Metals: Steel

Steel is primarily used by the cable industry for armouring or strength members. The steel price has recovered a little from the slump which began at the end of 2008, but it is still trading well below pre-crisis peaks. After a slight rise in September prices fell back in most regions in October and as a result our CRUspi index fell by 1.5%. This easing

of prices is mainly down to a reduction in raw material prices and also softness in demand. Demand is forecast to remain subdued for the rest of 2010, but prices are forecast to rise in 2011 on the back of improving demand and increasing scrap costs.

> Slide 4

Oil Price Relatively Stable

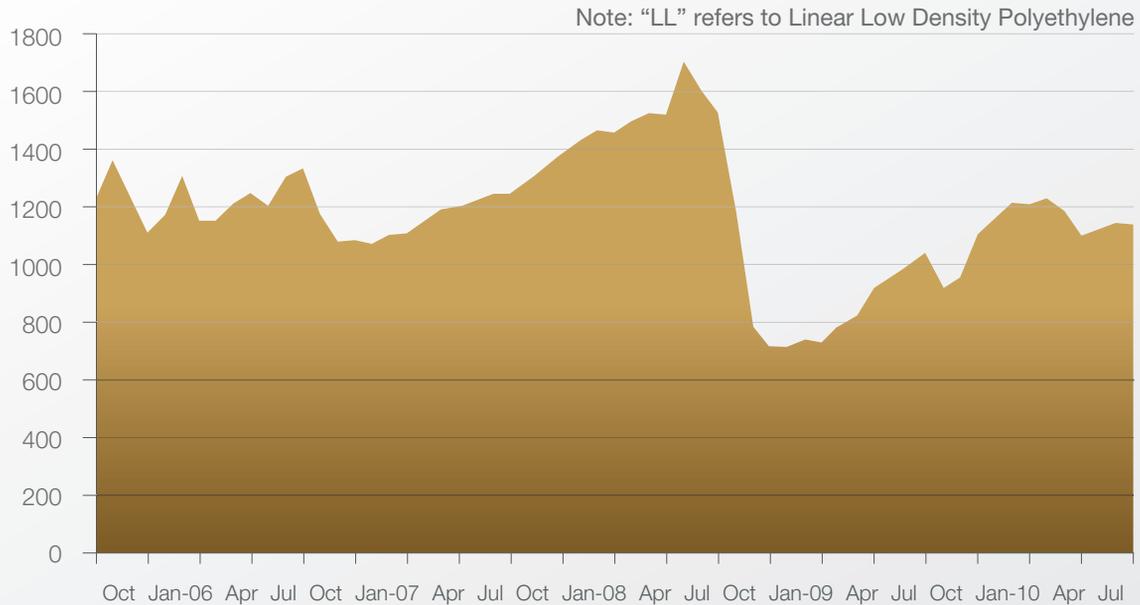
The other main raw materials used in the production of metallic wire and cable are a range of polymers, most of which are produced using petrochemicals as a primary starting point. As a result the price of these polymers is strongly influenced by the oil price. As can be seen in the chart the price of oil has followed a similar path to many of the metals we have looked at, with a peak in 2008 followed by a sharp fall and then a recovery. After peaking at over US\$120/bbl

the price fell to near US\$40/bbl before recovering to around US\$80/bbl in the first three quarters of 2010. In the last few months the price has edged higher and is approaching US\$90/bbl, primarily due to the weakness in the US Dollar. Current forecasts show that whilst the price may rise modestly next year the chances of a sharp increase in price are quite small at present.

> Slide 5

With the price of oil having risen from its low point in Q1 2009, polymer prices have also been on the rise with the price of linear low density polyethylene (LLDPE) as traded on the LME having risen from a low of US\$720/tonne at the end of 2008 to now be trading at close to US\$1170/tonne. PVC prices are currently stable after falling in the middle of the year from a peak in April. If, as is forecast, the price of oil continues to

LME LL PRICE TRADES IN THE \$1,100-\$1,150/T RANGE THROUGH Q3 2010



Slide 6 | Data: LME

edge higher than it is likely that the price of LLDPE and other polymers will also rise, although they should remain below the peaks seen in mid 2008.

> Slide 6

OPTICAL FIBRE

No Shortage but No Excess Capacity

From 2008 to 2009, the fibre market jumped from 148 million fibre-km to 184 million – a 24% increase. Worldwide fibre makers as a group were able to meet the increased level of demand, but only just. From 2007 onwards, there has been very little excess capacity – supply and demand have been balanced on a worldwide level. During these years, when fibre demand was achieving new

record-setting peak levels, supply was able to keep up with demand for two main reasons. First, several major fibre makers increased their total capacity by adding units of production equipment, such as draw towers, or by turning up capacity that had been unused. Second, there have been technical improvements that have given the industry the ability to make larger performs and to draw larger performs into fibre.

Key Markets Rely on Imports

Much of the new or previously mothballed capacity brought on line after 2007 was in North America and Europe, but most of the increased demand was in Asia, especially in China. New capacity in India and China has helped to meet the surge in Asian fibre demand, but there also has been an increase in the amount of fibre shipped internationally – from a

level of 47 million fibre-km in 2007 to 71 million in 2009. The demand and international shipments projected for 2010 are expected to be about the same as in 2009. In other words, more than a third of the world's fibre is exported. This means that fibre producers in markets such as Denmark, France, India, Japan, Korea, Netherlands, and the US, which had capacity in excess of domestic demand, were able to take advantage of strong growth in other markets – mainly China. In 2009, China consumed 47% of the world's fibre; whereas it only manufactured 35%.

Prices Remain Under Pressure

In late 2007, there was evidence of tight supply in some regions or in some months. At that time, there was speculation that near-term demand growth might allow the price declines of pre-

ceding years to be reversed, that prices might stabilize or show slight increases. And in 2008, particularly in the second half, bare fibre prices did show a noticeable increase. In some countries, Q4 2008 prices were as much as 10% higher than Q1 2008 prices for some fibre types. But with the expanded capacity and the balanced supply situation, there has been no significant rise in bare fibre prices since late 2008. Rather, there have been incremental price decreases in some markets, mainly due to the role of large procurements with one-year or multi-year contracts. Considering the cost of operating fibre plants and the investments in capacity, fibre makers have competed aggressively for large long-term contracts. With many world-class fibre makers able to make fibres that meet or exceed well accepted international standards, the competition results in pressure on prices.

Preform vs. Draw Capacity

The main limiting factor in the production of fibre is capacity for making preforms. This is the chemical processing step that results in the highly-purified glass rods from which the fibre is drawn. The second major step is drawing, and the world's total draw capacity is about 25% more than the world's preform capacity. As a result, there has been an increase in the international shipments of preforms since 2007, in addition to the increased trade in bare fibre. Another development has been the formation of new preform-making facilities. Four new joint venture companies have been formed since late 2008 with the objective of establishing new preform factories in China. At least two of these are entering production in the latter half of 2010. This development means that China will have the potential to take a more prominent role in the worldwide supply of fibre, along with its strong role in demand.



New Fibres Address Bend Performance

The fibre industry's main advance in terms of new products in recent years has been bend-insensitive fibres (BIFs). These products have been designed to make it easier to handle and install the fibres, as well as to allow more compact splice and interconnect hardware. Since 2006, the International Standards Union has published a standard (ITU-T G.657) and also released one revision, which increased the number of standardized types or attribute classes. This standard covers bend-insensitive single-mode fibres, which are becoming well established in several applications, such as high-performance jumpers and compact flexible cables for access network installations. In the latter case, G.657 fibres are proving instrumental in the deployment of fibre-to-the-premises networks in multi-dwelling unit buildings, such as apartment blocks. Several major companies also have introduced bend-insensitive versions of multimode fibres for high-density applications in data centres and other on-premises networks.

WIREROD SUPPLY

Copper Wirerod Capacity Utilisation Falls

The slump in demand for wire and cable as a result of the economic crisis resulted in lower copper wire and cable production and consequently a fall in utilisation at copper wirerod plants. Although there have been some closures of rod mills, primarily in Western Europe where Nexans' closure of its mill at Chauny was the latest capacity reduction, capacity expansions in the Middle East, with two new plants in the UAE, and China, has meant that total global wirerod production capacity has continued to rise. As a result the gap between output and capacity grew quite sharply in 2009 with average utilisation falling from almost 75% in 2007 to around 60% in 2009.

China is the Dominant Producer

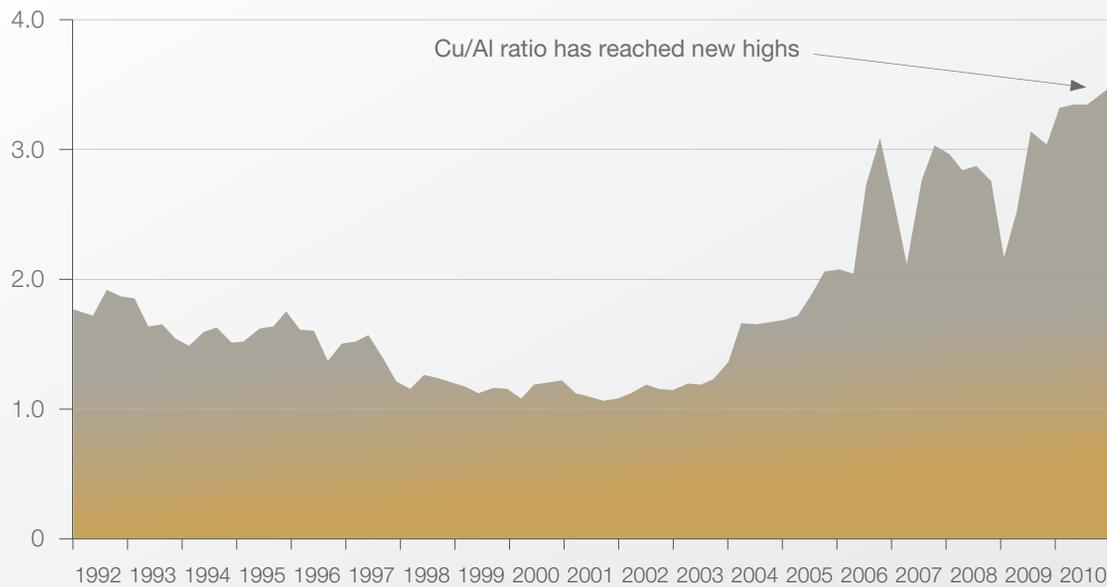
As demand for copper rod in China has continued to grow so has the capacity to produce it, but such has been the strength in consumption growth that production has struggled to keep up. As a result China has remained a net importer of copper wirerod despite it producing around 34% of the world's total in 2009. With consumption growth expected to moderate and capacity continuing to increase we are forecasting that China could become self sufficient in rod by 2013, which will mean that those companies exporting to China could be looking for new markets by then.

No Shortage of Wirerod Production Capacity But What About Cathode?

Based on our forecasts of copper wirerod demand and production capac-

COPPER/ALUMINIUM PRICE RATIO

Ratio



Slide 7 | Data: CRU, LME

ity there will continue to be plenty of available capacity to meet demand at a global level. What is probably of more potential concern is the availability of cathode to make the rod. With the copper market looking set to be tight in 2011 it may be that not all rod mills will be able to get sufficient cathode to meet their needs, which could cause some local shortages of rod.

Aluminium Wirerod Production Grows, But So Does Demand

Production capacity for aluminium wirerod has also been rising, with significant capacity being added in India in particular. Demand for aluminium wirerod has also been growing as the high price of copper relative to aluminium has led to some substitution of copper by aluminium. With the price differential between copper and aluminium set to grow there is likely to be further sub-

stitution and with the market for aluminium wirerod already looking quite tight, this could put further pressure on supplies. Strong demand for overhead conductors in China, India, Brazil and the Gulf States has also limited rod supply to insulated wire and cable manufacturers.

MATERIAL SUBSTITUTION

Cost of Copper v Aluminium

The most obvious material substitution for the cable industry is to use aluminium as a conductor rather than copper. In looking at the relative cost of copper and aluminium conductors a combination of the price ratio, the specific gravity ratio and the conductivity

ratio needs to be taken into account to get a true idea of the cost saving in using aluminium. Copper is much heavier than aluminium (with a specific gravity of 8.9 g/cm³ compared to 2.7 g/cm³ for aluminium) and so a copper conductor weighs 3.3 times the weight of an equivalent sized aluminium conductor. However, aluminium only has 61% of the conductivity of copper and so to carry the same current an aluminium conductor needs to be 61% larger in area. Thus by weight you need to use around 2 times as much copper as aluminium (3.3 x 0.61) to get an equivalent conductor capable of carrying the same current. Since the price ratio between copper and aluminium is now approaching 3.5 this means that an equivalent copper conductor costs 7 times as much as an aluminium one.

> Slide 7



But a Simple Cost Comparison Does Not Tell the Whole Story

Of course a simple cost comparison as above does not tell the whole story. Since cables are sold in standard conductor sizes it is not possible to buy an aluminium conductor cable with exactly the equivalent conductivity of a copper cable, so if the switch to aluminium is to be made then a cable with a larger aluminium conductor than is strictly necessary may need to be used. As a rule of thumb an aluminium cable two conductor sizes larger than a copper cable will generally be needed. Since the conductor needed will be larger for aluminium it follows that the aluminium cable will also need more insulation, sheathing and armouring material, and this erodes the price saving in using aluminium. This means that the price advantage of aluminium over copper is less as the conductor becomes a smaller proportion of the overall cable cost.

If for example you consider a 70 square mm copper cable in which the conductor cost of a copper cable is 65% of the total cable cost then the equivalent 120

square mm aluminium cable would be 23.5% cheaper. If for the same comparison the copper conductor was 80% of the total cable cost then the cost saving in using the aluminium cable rises to 46%. It is only when the cost of the copper conductor falls below 50% of the cable cost that the equivalent aluminium cable may no longer be cheaper. Since for most LV power cables and many MV power cables the cost of the conductor is now well over 50% it is generally true that the equivalent aluminium power cable is cheaper than the copper one and it can represent a significant saving.

This of course is also true about other types of cable and further on in this article we will look at some of the other issues that impact on the possible substitution of copper with aluminium across other types of cables. One side effect of the fact that substitution of an aluminium cable for a copper one will often involve using a cable with a lower resistance is that the aluminium cable will have lower losses than the copper cable, which is a plus point in today's climate of promoting energy efficiency.

COPPER-CLAD ALUMINIUM

Renewed Interest in CCA?

Copper clad aluminium (CCA) has been around for many years, along with copper clad steel (CCS), although its use has historically primarily been confined to communication cables where the skin effect (the effect whereby high frequency signals are carried mostly by the surface of a conductor) means that the conductivity of a CCA or CSS conductor can be almost equivalent to a solid copper conductor. In the past in times of high copper prices it has been touted as a possible alternative to copper for use in energy cables, but historically nothing significant has ever come of this. Now that the price of copper is again high and looks set to remain so CCA is again being talked about as a possible substitute for copper.

CCA consists of copper cladding surrounding an aluminium core. The most common grade of CCA is 10% CCA, meaning that it contains 10% copper by volume: only 5% of the radial thickness of this grade of CCA is copper and the rest is aluminium, though it contains approximately 43% copper by weight, since copper is a much denser metal than aluminium. 10% CCA has an overall conductivity of 65% IACS, i.e. 65% of the conductivity of an all copper conductor of the same cross-section, but its average density is only 37% of copper.

CCA Promoted as Low Cost

CCA suppliers promote the material as offering most of the advantages of aluminium, such as having lighter weight and lower cost than copper, but without the main perceived disadvantages of aluminium. With CCA they argue that to

get reliable electrical connections there is no need for specially designed accessories, as there can be with aluminium wires used in LV energy cables. Though CCA appears to have a significant cost advantage over copper because its main constituent is the cheaper metal aluminium, in practice some of this advantage is eroded by the higher fabrication costs of CCA, as cladding processes are more complex than conventional wire-drawing. The lower conductivity means that in many applications a larger conductor size is also needed due to the lower conductivity and consequently more other materials are needed. As a result even with the current price differential CCA does not always offer a significant price advantage over copper.

CCA Production Quite Concentrated

There are many producers of CCA conductors in China, with the largest of these being Fushi Copperweld, a Chinese company that is listed in the US. This company also has a significant manufacturing presence in the US following its acquisition of Copperweld, but outside of China and the US there is little production of CCA. Fushi Copperweld has a total production capacity of around 36,000 tonnes and we estimate that total global production of CCA in 2009 was not more than 180,000 tonnes. Since the majority of this was used in traditional communication cable applications it can be seen that at present the usage of CCA outside of its traditional markets is still quite small. The lack of production capacity, particularly in Europe, has been cited as one reason for a lack of enthusiasm for using CCA here.

New Applications for CCA?

Apart from the traditional applications of CCA, in coaxial cables and some

specialised magnet wires, CCA is now being used in other applications. One of these is LAN cables, primarily in China. The use of CCA means that the cable is priced significantly lower than conventional LAN cables, although we understand that these low cost substitutes would not meet all the technical performance specifications required for LAN cables used in business premises. They could though be suitable for use in a domestic environment. We have also heard of CCA being used for cables for sensors and it also being looked at for cables in wind generation towers, where the lower weight is an advantage. Other possible uses are for building wire and power cables. One of the main barriers to use in these sorts of cables is the fact that CCA is not included in specifications. In the past some specifications, such as the British Standard for building wire, did include CCA as an option, but this option was removed and so for CCA to have a chance of gaining wide acceptance it will require a change of specifications to include CCA. Since this takes a long time we do not foresee the use of CCA in these types of applications in the near future. Where CCA could gain acceptance is in applications where its exclusion from public standards is not so important ie in the OEM sector where a manufacturer can set his own standards.

Potential for Scrap Contamination with CCA

One of the issues that has been raised in relation to the use of CCA has been the difficulty in recycling and also the risk of contamination of pure copper scrap. Whilst tinned copper wire can be readily identified, segregated and diverted through its surface appearance, scrap CCA wire is potentially much more of a problem. Superficially CCA wire appears to be the same as copper wire: it is nec-

essary to look at the wire in cross-section to be sure that a wire is pure copper and not CCA. The aluminium content of CCA is a big potential hazard as it could contaminate a batch of clean copper wire scrap, and careful checking would be needed to avoid this problem. This has not been a major issue while CCA wire has been used only in niche applications, but it would become a more serious problem if CCA were in wider use. In Europe there has been some CCA contamination of scrap feedstock. In China there has been caution about approving CCA more widely because of concerns about CCA scrap.

Lots of Trials but Little Actual Substitution

Overall there has been lots of talk about using CCA as a substitute for copper, and many users such as OEMs have performed trials but we have been unable to identify many cases, other than niche applications such as jump leads, where this has led to genuine substitution. When the copper price fell at the end of 2008 much of this interest waned. Now that the copper price has risen again and looks set to go higher there is expected to be a renewed interest in CCA, and maybe this time some of the trials could turn into actual usage. However, the conservative nature of users and limited availability means that this is likely to be quite a slow process.

BUILDING WIRE

Likely to Remain the Preserve of Copper

From a global perspective, the use of aluminium conductors in building wire is very limited. Aluminium is not accepted at all in most markets and

even where it is used it is only a very small part of the market. Even in some markets where aluminium building wire was widely used at one time (e.g. India), copper building wire is now generally preferred. Despite the major increase in the cost of copper over the last two years, we do not believe that this will change due to the inherent risk of poor quality connections as a result of the tendency of aluminium to creep and form an insulating oxide layer. These effects were identified as the possible cause for house fires in the US during the 1960s and 1970s, and despite the development of alternative alloys and improved accessories to try and counteract these effects, we are unable to detect any move to reintroduce aluminium building wire.

AUTO CABLES

Weight Saving an Added Advantage for Aluminium Auto Wires

As well as the potential cost saving one of the other advantages of aluminium cables is their lighter weight. This is not an issue for most cables (other than those installed overhead which have always been aluminium), but in the search for extra economy in vehicles weight saving can be an advantage. Of course this has to be balanced with the extra space needed for aluminium cables and the major issue of reliable terminations, but it does mean that there is renewed interest in using aluminium for automotive wires. Aluminium has been used for a while now for battery cables, but there are plans to introduce it into mainstream harness applications with Sumitomo Electric one of the companies that are planning to start using it. Sumitomo will start supplying

a harness using aluminium conductors to Toyota for use in the Yaris in 2011. The aluminium harness is claimed to be 40% lighter than the equivalent copper harness.

Other Alternatives for Harnesses

As well as using aluminium there are a number of other alternatives that are being investigated by the major wiring harness producers. One possibility is to use copper clad aluminium. For finer sizes of wires it may also be possible to reduce weight and cost while staying with copper by reducing conductor sizes and using hard-drawn copper or copper alloys with greater tensile strength than the usual annealed copper wire. Another option is the inclusion of strength members in with the copper to allow less copper to be used. The timescale for any such developments is inevitably slow, as harness designers have to work very closely with the car producers and any successful innovations can only be introduced as new models come on stream. For example the announcement that the new Yaris was to use an aluminium harness was made in 2008, with the actual introduction planned for 2011.

APPLIANCE WIRE

Likely to stay with copper for now

Appliance wire is similar to automotive wire in that it is generally formed into a harness before installation into the final product. However the volume of wire is often quite small and the advantage of weight saving is not such an issue for appliances. As a result there is less interest in the use of aluminium appliance wire. However, if aluminium automotive wire proves to be a big suc-

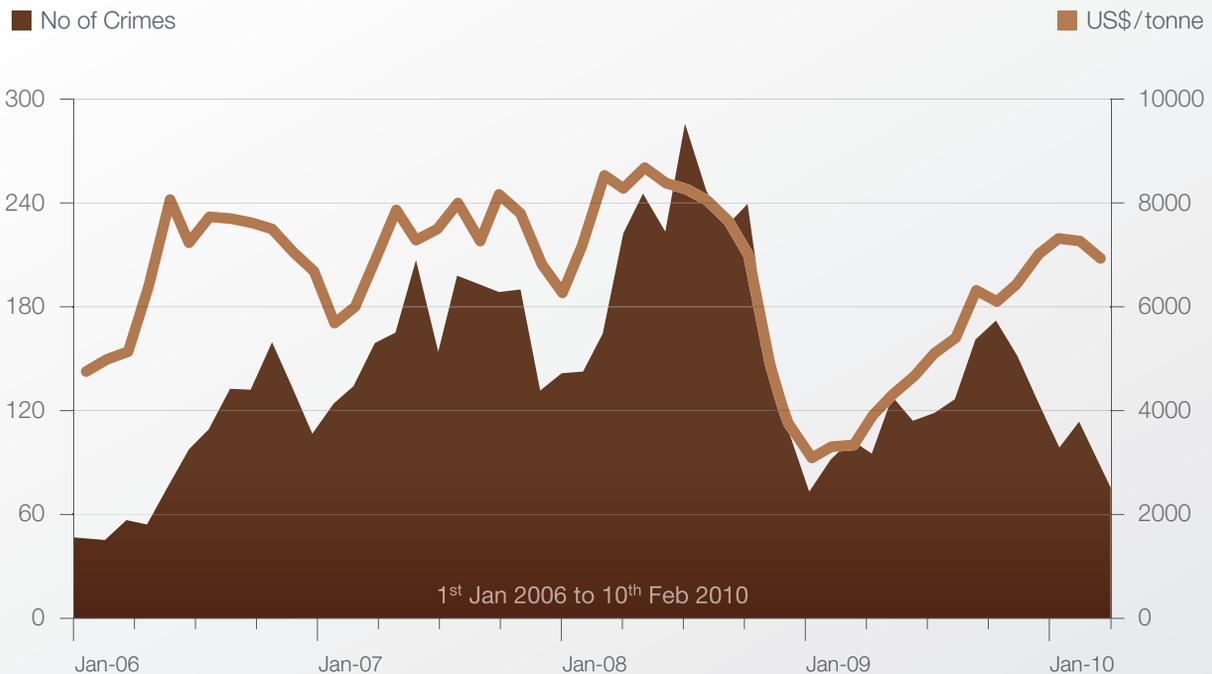
cess and the termination technology is easily transferable to appliances and a significant cost saving is demonstrated, then this could become an area of substitution in the future. Another recent development that could help the use of aluminium in electrical equipment is the development of a solderable aluminium wire. The aluminium is coated with a tin based alloy which allows it to be soldered and this could increase the potential for aluminium to be used in place of copper by making it easier to terminate. CCA is also a potential alternative for appliance wire.

WINDING WIRE

Quite a Few Trials, But Copper Still King

There has long been use of aluminium winding wire, but traditionally this has been limited to certain specific applications. Distribution and other transformers rated at 15kVA and above often use aluminium windings, particularly pole mounted transformers where the weight advantage of using aluminium is significant. Aluminium has also been used in some low duty cycle motors such as waste disposal units and automatic garage door openers, particularly in the US which operates on a relatively low mains voltage. Outside of these applications copper continues to dominate the market and there are a number of technical reasons why aluminium is not considered suitable for high efficiency high duty cycle motors. Talking to the industry it seems that many trials have been conducted with CCA but these have generally not led anywhere, although CCA is used for high frequency coils. Overall there is likely to be some continued substitution of copper but it will only be a gradual process.

THEFTS OF COPPER CLOSELY RELATED TO THE COPPER PRICE



Slide 8 | Data: LME, Chart: British Transport Police

CABLE THEFT

Theft a Worldwide Problem

There continue to be frequent reports of cable theft, both of power cables and of telecom cables, from many parts of the world, with cables being stolen for the scrap value of their metal content, especially copper. Though cable theft has existed as a low level problem for many years, it has become a much more serious issue as a result of the rise in metal prices. This problem is widespread and is certainly not limited to poorer developing countries. For example, in the US local telecom carriers have regular problems with theft of sections of pole-mounted copper telecom cables from their access networks. In the UK, British Transport Police, the force that maintains security on the rail network, have stated that

reducing cable theft is one of their highest priorities, and as can be seen in the chart the incidence of theft is closely related to the price of copper. To try and reduce theft there are various innovations being tried to make cables less attractive to thieves. One option has been to introduce some steel wires into the conductors to make it more difficult to recover the copper. Whilst these sorts of initiatives may have some effect, the main impact of the theft threat is to make aluminium a more attractive option for the conductor material in power cables and optical fibre for communication cables. > Slide 8

CONCLUSIONS

The price of copper and some other raw materials used by the cable industry is forecast to remain high and volatile for

the next couple of years at least and cable manufacturers need to be able to manage this situation. In addition it is possible that copper supplies could be quite tight next year and so companies will need to make sure they have suitable supplies assured. If, as expected, the price of copper rises further next year, this will give extra impetus to customers looking for alternatives. Whilst there are sufficient supplies of aluminium rod at present a significant growth in the use of aluminium in place of copper could put pressure on aluminium rod supplies, although we do not foresee any shortages in aluminium metal. Historically cable manufacturers have been fairly neutral about substitution of copper, taking the view that they will make cables with whatever the customer requests. We believe that there is now an opportunity for the cable industry to be more proactive in working with customers to investigate more cost effective alternatives.



RAW MATERIALS UPDATE